09-CV-00948-WEC

Milwaukee Electric Tool Corp., et al. v. Hitachi Koki Co., Ltd. et al.

EXHIBIT 8

EXHIBIT 8 TO HITACHI KOKI CO., LTD. AND HITACHI KOKI U.S.A., LTD'S OPENING CLAIM CONSTRUCTION BRIEF – FILED ON MAY 25, 2012

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF WISCONSIN

MILWAUKEE ELECTRIC TOOL CORPORATION, METCO BATTERY TECHNOLOGIES, LLC, AC (COMERCIAL OFFSHORE DE MACAU) LIMITADA, and TECHTRONIC INDUSTRIES CO. LTD.,	)	CASE NO.: 09-cv-948-WEC
Plaintiffs,	)	PATENT CASE
v.	)	JURY DEMANDED
HITACHI KOKI CO., LTD., and HITACHI KOKI USA., LTD.,	)	
Defendants.	)	

EXPERT REPORT OF WALTER VAN SCHALKWIJK, PH.D. ON THE ISSUES OF CLAIM CONSTRUCTION AS TO U.S. PATENT NOS. 7,554,290, 7,164,257, 7,176,654, 7,323,847, and 7,508,167

I. SUMMARY AND SCOPE OF OPINIONS

1. For the purposes of this report, I have been retained by McDermott Will & Emery LLP as an expert in the field of battery technology generally, and more specifically, Lithium-ion batteries, to provide opinions in the lawsuit brought by Plaintiffs Milwaukee Electric Tool Corporation, Metco Battery Technologies, LLC, AC (Comercial Offshore de Macau) Limitada, and Techtronic Industries Co. Ltd. (collectively "Plaintiffs") against Hitachi Koki Co., Ltd. and Hitachi Koki U.S.A., Ltd. (collectively "Hitachi Koki") concerning claims 1, 6, and 8-10 of U.S. Patent No. 7,554,290 (the "'290 patent") (attached as Exhibit 3), claims 1-3 and 12 of U.S. Patent No. 7,164,257 (the "'257 patent") (attached as Exhibit 4), claims 1, 23, 57, 58, and 62 of U.S. Patent No. 7,176,654 (the "'654 patent") (attached as Exhibit 5), claims 1, 9, and 10 of U.S. Patent No. 7,323,847 (the "'847 patent") (attached as Exhibit 6) and claims 1, 8, 12, and 15 of U.S. Patent No. 7,508,167 (the "'167 patent") (attached as Exhibit 7) (collectively, the "Asserted Claims" or the "Asserted Patents"). I reserve the right to supplement and provide additional opinions and/or bases for those opinions regarding these and any additional claims that may be asserted in the lawsuit at a later time.

2. If called as an expert witness to testify in this matter, I anticipate that my testimony will likely concern the matters addressed in my report including attachments, and the materials I relied upon in rendering my opinions.

3. In general, I expect to testify regarding my own qualifications, skill, experience, my opinions regarding the understanding of certain of the disputed claim terms that would be held by a person of ordinary skill in the art as of the alleged invention date, and my bases for those opinions. I am also prepared to testify about the background of the relevant technology, should the Court have any questions.

4. My anticipated testimony may be affected by positions Plaintiffs (or its experts and other witnesses) take on these topics. Plaintiffs may communicate at least some of those positions to Hitachi Koki sometime after this report is prepared. After I have had the

opportunity to review those positions or any new information, I may supplement this report.

II. BACKGROUND INFORMATION AND QUALIFICATIONS

5. I am a consultant with EnergyPlex Corporation. I specialize in battery technology and applications including battery chemistries, theoretical principles, manufacturing methods, performance and limitations, charge methods, monitoring and control, battery testing, packaging, application engineering, economics, and in the development of requirements and specifications. Additional information regarding my expertise is contained in my CV attached as Exhibit 1 to this report. Exhibit 1 also includes a list of publications I have authored or co-authored in the last ten years and identifies a list of cases in which I have testified as an expert at trial or by deposition in the last four years.

6. I received a Bachelor of Science in Chemistry in 1975 from Lowell Technological Institute (now University of Massachusetts at Lowell). In 1977, I received a Masters of Science in Chemistry from Carleton University in Ottawa, Ontario, Canada. In 1987, I received a Ph.D in Chemistry from the University of Ottawa.

7. I have been involved in research, product development, manufacturing, battery electronics, and applications engineering in the battery industry since 1977. While I was working for GTE Corporation from 1977-1979 and 1983-1985, I had direct experience in the design and manufacture of Lithium batteries. I had responsibility for developing Li/SO_2 (Lithium/Sulfur-dioxide) rechargeable batteries and very large $Li/SOCl_2$ (Lithium/thionylchloride) batteries for military and telecommunications applications. From 1986-1988, I worked at Energy Research Corporation as a Principle Research Scientist in a Department of Energy ("DOE") and Electric Power Research Institute ("EPRI") sponsored research and development program on Zn/Br_2 (Zinc/Bromine) batteries. In 1988, I formed an engineering research and consulting company named Inland Research Corporation and provided research and consulting in batteries and environmental engineering.

8. In 1991, I became Director of Product Development and Director of Research at Moli Energy Ltd. In this role, I managed research and technology transfer from fundamental research to prototype development to manufacture of new battery products based on lithium-ion technology. During my time at Moli Energy (then owned by NEC of Japan), we were the second company in the world to commercialize the lithium-ion battery.

9. Since 1994, I have worked as a consultant with EnergyPlex Corp. providing consulting services in several areas, such as battery chemistries, including their construction, manufacture, application engineering, testing and evaluation, and product development, engineering, and manufacturing of portable power systems. In this role, I have worked with numerous clients in all aspects of the battery industry, medical appliance and industrial test equipment industries, and legal and financial industries. During this time, I have also developed research relationships with the University of Washington (where I am an Affiliate faculty with the rank of Full Professor in the Department of Chemical Engineering) and the University of Rome relating to the design and development of battery technology.

10. I am the co-editor and authored multiple chapters in a book entitled "Advances in Lithium-Ion Batteries," which was published in 2002. I am also the co-editor and have authored multiple chapters in the second edition of the same book, which is scheduled for publication in 2011.

11. I am a member of The Electrochemical Society and have served on numerous committees and have held several positions within that organization, including the following: Board of Directors (1999-2003), Chairman of New Technology Committee (1999 – 2003), Chairman of Nanotechnology Committee (2003 – 2006), Vice-Chairman of New Technology Committee (2006 to Present), Member of the Individual Membership Committee (2009 to Present), Technical Affairs Committee (1998 – 2006), and Executive Committee of Battery Division (2002 – 2004).

12. I am being compensated at a rate of $350 per hour for work on this matter relating to research and preparation of reports. I am being compensated at a rate of $500 for work on this matter relating to preparation of and providing testimony and as an expert at trial or by deposition.

III. MATERIALS REVIEWED

13. I have reviewed the patents and file histories for the Asserted Patents, as well as other information and documents cited in this declaration and/or listed in my List of Things Considered (attached as Exhibit 2). I understand that there may be additional discovery exchanged between the parties during discovery (both expert and fact discovery), including some possible depositions, and I will consider other information and documents produced through discovery to determine whether the additional information and documents have any impact on my opinions. I will also consider any criticisms of my opinions or the bases for my opinions that may be brought to my attention during my deposition or by other experts. Based on the additional information and documents and/or criticisms, I will supplement or amend this report as necessary.

IV. LEGAL STANDARDS

14. Attorneys for Hitachi Koki have provided me with the following basic legal standards and I have applied these standards in forming my opinions.

15. THE HYPOTHETICAL PERSON. My opinions regarding the meaning and scope of the claim terms (and claims) are rendered from the perspective of a hypothetical person of ordinary skill in the pertinent art as of the time of the invention, *i.e.*, the effective filing dates of the patent applications for the asserted patents. I understand, the '290 patent was filed on July 20, 2007 and purports to be a continuation of patent application no. 10/721,800 filed on November 24, 2003 (now U.S. Patent No. 7,253,585) and claim the benefit of several provisional patent applications filed between November 22, 2002 and November 19, 2003. I understand that the '257 patent was filed on December 20, 2005 and purports to be a divisional of application no. 10/720,027 filed on November 20, 2003

and claim the benefit of several provisional patent applications filed between November 22, 2002 and November 19, 2003. I understand that '654 patent was filed on November 20, 2003 and purports to claim the benefit of several provisional patent applications filed between November 22, 2002 and November 19, 2003. I understand that '847 patent was filed on December 28, 2006 and purports to be a continuation of patent application no. 10/719,680 filed on Nov. 20, 2003 (now the '654 patent) and claim the benefit of several provisional patent applications filed between November 22, 2002 and November 19, 2003. I understand the '167 patent was filed on August 10, 2007 and purports to be a continuation of patent application no. 11/322,782 filed on Dec. 30, 2005 (now U.S. Patent No. 7,262,580), which is a divisional of patent application no. 10/719,680 filed on November 20, 2003 (now the '654 patent) and claim the benefit of several provisional patent applications filed between November 22, 2002 and November 19, 2003. For the purposes of this report, I have provided my opinions from the perspective of a hypothetical person of ordinary skill in the pertinent art as of 2003, although I understand that Plaintiffs have alleged that they are entitled to an earlier date of conception of at least as early as late 2001. The two year difference between Plaintiffs' alleged date of conception of the Asserted Patents and the earliest potential filing date of a non-provisional application to which any of the Asserted Patents may be entitled does not change my opinions as to the meaning and scope of the various claim terms since I do not believe the understanding of the person of ordinary skill would have changed in the intervening two years. I will use the term "person of ordinary skill" or "one of ordinary skill," as a shorthand for the hypothetical person of ordinary skill in the art at the time of the alleged invention.

16. LEVEL OF SKILL IN THE ART. I understand that my opinions regarding claim construction should be rendered from the perspective of the hypothetical person of ordinary skill in the battery and electrochemical arts and their application to appliance design. In my opinion, the level of skill of such a person in 1998 would have been

someone with a Master's Degree in chemistry, chemical engineering, or electrical engineering focusing on battery technology and applications, or a Bachelor's Degree in chemistry, chemical engineering, or electrical engineering and three to five years experience in battery applications.

17. CLAIM CONSTRUCTION. I understand that in claim construction, one must ascertain the proper meaning and scope of the claim. I further understand that claim construction is a matter of law and will be decided by the Court. I understand that patent claims are construed in light of (i) the claims; (ii) the specification, including the drawings, of the patent; and (iii) the prosecution history of the patent (the "file history"), including the cited references. I am informed that this is referred to as the "intrinsic" evidence. The Court may consider additional evidence ("extrinsic" evidence) which is outside the patent and prosecution history. Extrinsic evidence can include expert opinion (including opinions regarding what one of ordinary skill in the art would have known or understood), dictionaries, treatises, and testimony.

V. CLAIM CONSTRUCTION ANALYSIS

A. U.S. Patent No. 7,554,290

1. "battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps"

Relevant Claims	Hitachi Koki's Proposed Construction
'290 Patent: Claim 1	Each of a plurality of battery cells having the ability to discharge about 20 amps of current over any non-trivial period of time

18. In my opinion, a person of ordinary skill in the art would have understood the term "battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps" to mean: *each of a plurality of battery cells having the ability to discharge about 20 amps of current over any non-trivial period of time*.

19. In my opinion, claim 1 requires that ***each of the battery cells*** in the plurality of battery cells be capable of producing an average discharge current greater than or equal to approximately 20 amps.

20. The language of the claim 1 requires that ***each of the battery cells*** in the plurality of battery cells be capable of producing an average discharge current greater than or equal to approximately 20 amps. Claim 1 recites "a plurality of battery cells supported by the housing, the battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps." In claim 1, when the cells are collectively referred to, the claim uses the term "plurality of battery cells." However, the claim language at issue refers only to battery cells, not the plurality of battery cells (*i.e.*, "***the battery cells*** capable of producing an average discharge current greater than or equal to approximately 20 amps"). Thus, the phrase "battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps" means that "each of a plurality of battery cells having the ability to discharge about 20 amps of current over any non-trivial period of time."

21. One of ordinary skill in the art would have also looked to the specification to determine what is meant by "the battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps." A person of ordinary skill in the art would have seen that in each and every embodiment disclosed in the '290 patent, the plurality of battery cells are placed in a series connection. *See* Ex. 3, '290 patent, FIG. 21 (ref. numerals **46***a*-**46***e*), FIG. 22 (ref. numeral **46**), FIG. 23 (ref. numerals **46***a*-**46***e*), FIG. 68 (ref. numerals **346***a*-**346***g*), and FIG. 69 (ref. numerals **346***a*-**346***g*). It is well known that when a plurality of battery cells are placed in a series connection, each of the battery cells in the series connection produces the same amount of current. When power is drawn from the battery pack by a power tool, there exists only a singular electrical path for current to flow through the series connected battery cells. In such situations, the current passing through each battery cell is the same.

22. Given that every embodiment illustrated in the figures of the '290 patent discloses that the plurality of battery cells are placed in a series connection, a person of ordinary skill in the art would understand that the current through each of the battery cells must be the same. Accordingly, a person of ordinary skill in the art would have understood that the term "battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps" requires that ***each battery cell*** in the plurality of battery cells has the ability to produce the required average discharge current of 20 amps.

23. The extrinsic evidence also supports my construction. It was well known at the time of the alleged invention that "discharge current" was the current flowing out of a battery cell. *See e.g.*, THE ILLUSTRATED DICTIONARY OF ELECTRONICS, 199 (8th ed. 2001) (attached as Exhibit 8) (defining "discharge current" as "current flowing out of a cell—especially a storage cell"). A person of ordinary skill in the art would recognize "storage cell" to mean "battery cell." This extrinsic evidence confirms that a person of ordinary skill would have understood that the discharge current is the current flowing out of a battery cell. As such, a person of ordinary skill in the art would have understood that for a plurality of battery cells, the average discharge current is the current that is flowing out of each of the battery cells.

24. It is my opinion that the specification of the '290 patent fails to disclose sufficient information to enable a person of ordinary skill in the art to connect the battery cells in any configuration other than a pure serial configuration (*i.e.*, all the battery cells are connected in series) without undue experimentation. Although the specification states that the battery cells can be "*electrically connected in any suitable manner*", which include "*a serial arrangement, a parallel arrangement, a partial serial arrangement (e.g., some of the battery cells* **346***a-g are connected in a serial arrangement), a partial parallel arrangement (e.g., some of the battery cells* **346***a-g are connected in a parallel arrangement) a combination of a serial, parallel, partial serial, or partial parallel arrangement*" (Ex. 3, col. 10, lines 46-53), the specification provides no explanation as to

how the battery connections would be made in a parallel arrangement, a partial serial arrangement, a partial parallel arrangement, or a combination of a serial, partial serial, or partial parallel arrangement. Rather, as explained above, the '290 patent only shows how to connect battery cells in series. It is my opinion that given the limited disclosure of the '290 patent, a person of ordinary skill in the art would have to engage in undue experimentation to determine how to connect battery cells in a partial serial arrangement, a partial parallel arrangement, or a combination of a serial, partial serial, or partial parallel arrangement.

25. A person of ordinary skill in the art would have also understood that the phrase battery cells "capable of producing an average discharge current greater than or equal to approximately 20 amps" means that each battery cell has "the ability to discharge about 20 amps of current over any non-trivial period of time."

26. The claims and the specification of the '290 patent fail to define the term "average discharge current." As such, a person of ordinary skill in the art would have turned to extrinsic evidence to determine the meaning of "average discharge current." According to the IEEE 100 THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS, average discharge current is defined as:

> The sum of the rectified charge quantities passing through the terminals of the test object due to partial discharges during a time interval, divided by this interval. The average discharge is expressed in coulombs per second (amperes).

See "IEEE 100 THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS", 73 (7th ed. 2000) (attached as Exhibit 9).

27. A person of ordinary skill in the art would have understood this definition of "average discharge current (*i.e.*, sum of charge quantities passing through the terminals of the battery cells due to partial discharges during a time interval, divided by that time interval) to be the average amount of current discharged by the battery cell over a time interval. Therefore, a person of ordinary skill in the art would have understood the phrase "capable

of producing an average discharge current greater than or equal to approximately 20 amps" to mean having "the ability to discharge about 20 amps of current" over a time interval.

28. It is my opinion that a person of ordinary skill in the art would consider this time interval to be a "non-trivial period of time." In my opinion, a person of ordinary skill in the art would consider the time interval over which the average discharge current of a battery is measured as being the shortest period of time that is long enough to accomplish a function of a hand-held power tool, such as drilling a hole, driving a screw, or cutting a small piece of wood. It would have been well understood by a person of ordinary skill in the art that this period of time is consistent with customary and ordinary use of the hand-held power tool.

29. I understand that Plaintiffs have preliminarily alleged that the term "battery cells capable of producing an average discharge current greater than or equal to approximately 20 amps" should mean "the battery cells, when configured together in a battery pack, are capable of producing reasonably close to 20 amps of discharge current or greater over the course of delivering their entire rated capacity." I disagree for several reasons.

30. In my opinion, one of ordinary skill in the art would not have understood that the limitation of "battery cells capable of producing an average discharge current" to mean that the "the battery cells, when configured together in a battery pack, are capable of producing [an average discharge current]". Rather, as noted above, the claims themselves indicate that each battery cell must be capable of producing an average discharge current of greater than or equal to 20 amps. Further, since the specification of the '290 patent only illustrates series connected battery cells, a person of ordinary skill in the art would have understood that claim 1 requires that each of the battery cells (as opposed to the battery cells collectively) is capable of producing the claimed average discharge current. Moreover, as I noted above, although the specification indicates that the battery cells may be arranged in a non-series connected configuration (*e.g.*, a parallel

arrangement, a partial serial arrangement, a partial parallel arrangement, or a combination of a serial, partial serial, or partial parallel arrangement), there is simply no written description to enable the concept of battery cells connected in any configuration other than a pure serial configuration (*i.e.*, all the battery cells are connected in series). As such, because the battery cells are connected in a pure serial configuration, ***each of the battery cells*** must have the ability to produce the required average discharge current of 20 amps.

31. Further, in my opinion, a person of ordinary skill in the art would not have understood the phrase "producing an average discharge current greater than or equal to approximately 20 amps" to mean "producing reasonably close to 20 amps of discharge current or greater ***over the course of delivering their entire rated capacity***." Plaintiff's proposed construction that the current must be produced "over the course of delivering their entire rated capacity" is not support by either the claims or the specification of the '290 patent. The '290 patent provides no guidance as to how to determine an average discharge current, and certainly does not explain that the average discharge current is determined "over the course of delivering their entire rated capacity." Indeed, the specification of the '290 patent is completely silent as to the time period over which the average discharge current is measured.

32. In the absence of any indication in the specification of the '290 patent of the time period over which the average discharge current is measured, it is my opinion that the most reasonable interpretation to one of ordinary skill in the art is that the average discharge current is measured over a non-trivial time period, where the non-trivial time period is the shortest period of time that is long enough to accomplish a function of a hand-held power tool. As noted above, this proposed construction is consistent with customary and ordinary meaning of the term "average discharge current", as evidenced by the IEEE 100 THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS:

> The sum of the rectified charge quantities passing through the terminals of the test object due to partial discharges during a time interval, divided by this interval. The average discharge is expressed in coulombs per second (amperes).

See Ex. 9, "IEEE 100 THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS", 73 (7th ed. 2000). Nothing in this extrinsic evidence requires that the average discharge current for a plurality of battery cells be determined "over the course of delivering their entire rated capacity." Rather, all that is required is that the average discharge current be calculated over some time interval, which as described above, would be understood by a person of ordinary skill in the art to be a non-trivial time period.

B. U.S. Patent No. 7,164,257

1. "state of charge"

Relevant Claims	Hitachi Koki's Proposed Construction
'257 Patent: Claim 1	**State of Charge when used to modify battery pack**: The amount of charge remaining at a given time for a battery pack. **State of Charge when used to modify battery cell**: The amount of charge remaining at a given time for a battery cell.

33. The asserted claims of the '257 patent use the term "state of charge" in the context of the state of charge of the battery cell and state of charge of the battery pack. *See e.g.*, Ex. 4, '257 patent, col. 36, lines 52-54 ("state of charge of each of the battery cells" and "state of charge of the battery pack").

34. In my opinion, a person of ordinary skill in the art would have understood the term "state of charge" when used to modify the term "battery pack" to mean: *the amount of charge remaining at a given time for a battery pack.*

35. The specification of the '257 patent clearly defines the phrase "state of charge" as "how much charge is left." For example, looking to the specification of the '257 patent (*i.e.*, the figures and text), the specification explains that the state of charge of the battery pack is the amount of charge left in the battery at a given time:

> In some constructions, the microprocessor 140 can determine the present state of charge of the battery 50 (***i.e., how much charge is left in the battery 50***) when the push-button 160 is depressed and outputs the charge level to the fuel gauge 155. For example, if the present state of charge of the battery 50 is approximately 100%, all of the LEDs 170 *a*, 170 *b*, 170 *c* and 170 *d* will be turned on by the microprocessor 140. If the present state of charge of the battery 50 is approximately 50%, only two of the LEDs, such as, for example, LEDs 170 *a* and 170 *b*, will be turned on. If the present state of charge of the battery 50 is approximately 25%, only one of the LEDs, such as, for example, LED 170 *a*, will be turned on.

Ex. 4, '257 patent, col. 8, lines 13-25 (emphasis added).

36. The specification also explains that the battery pack may include a "state of charge" indicator in the form a "fuel gauge." Ex. 4, '257 patent, col. 7, lines 56-59. The fuel gauge includes a light emitting diode ("LED") display that indicates the state of charge of the battery. *Id*. at lines 59-61. A microprocessor determines the present state of charge (*i.e.*, how much charge is left) when a push-button is depressed and outputs the charge level to the fuel gauge. *Id*. at col. 8, lines 13-17. For example, if the present state of charge (*i.e.*, amount of charge remaining) is 100%, all of the LEDs are turned on by a microprocessor. *Id*. at lines 17-20. If, for example, the state of charge is 50% (*i.e.*, amount of charge remaining), then two of the four LEDs will be turned on by the microprocessor. *Id*. at lines 20-22. Further still, if the state of charge is 25% (*i.e.*, amount of charge remaining), then one of the four LEDs will be turned on by the microprocessor. *Id*. at lines. 22-25. In my opinion, this description indicates that the state of charge for the battery pack is the "amount of charge remaining at a given time for the battery pack."

37. Turning to the extrinsic evidence, a standard technical dictionary supports my construction of "state of charge." A technical dictionary entitled "The Illustrated Dictionary of Electronics" defines "state of charge" as "the amount of charge, measured

in coulombs or ampere hours, in a storage cell or battery at a given time [a coulomb being an ampere second or 1/3600 of an ampere hour]. A measure of the available remaining energy in the cell or battery." Ex. 8, THE ILLUSTRATED DICTIONARY OF ELECTRONICS, 655 (8th ed. 2001). This definition provides support for my opinion that a person of ordinary skill in the art would have understood the term "state of charge" when used to modify the term "battery pack" to mean "the amount of charge remaining at a given time for a battery pack."

38. Further, it is my opinion that a person of ordinary skill in the art would have understood the term "state of charge" when used to modify the term "battery cell" to mean: *the amount of charge remaining at a given time for a battery cell*. Although the '257 patent does not explicitly define "state of charge" in the context of a battery cell, as shown above, the '257 patent explains that "state of charge" means "how much charge is left" at a given time (*e.g.*, when the push button is depressed). This definition is also consistent with the extrinsic evidence which defines state of charge as "the amount of charge, measured in coulombs or ampere hours, in a storage cell or battery at a given time. A measure of the available remaining energy in the cell or battery." Ex. 8, THE ILLUSTRATED DICTIONARY OF ELECTRONICS, 655 (8th ed. 2001). This extrinsic evidence further supports my opinion that a person of ordinary skill in the art would have understood the term "state of charge" when used to modify the term "battery cell" to mean "the amount of charge remaining at a given time for a battery cell."

C. U.S. Patent Nos. 7,176,654 and 7,323,847

39. I understand that the '847 patent is known as a "continuation" of the '654 patent and that both patents share a common specification. There is some offsetting of text in column 1 of the '847 patent due to the addition of the text at col. 1: lines 6-7; otherwise the text and figures are the same. To avoid confusion, all my citations below to column and line numbers shall refer to the specification of the '654 patent, which is attached as Exhibit 5.

1. **"nominal voltage range"**

Relevant Claims	Hitachi Koki's Proposed Construction
'654 Patent: Claim 1, 23, 57 '847 Patent: Claim 1, 9	Any voltage where the battery can reliably operate.

40. It is my opinion that the term "nominal voltage range" does not have an established meaning to a person of ordinary skill in the art. In addition, the claims and specification fail to clearly and explicitly define what is meant by the term "nominal voltage range."

41. Based on the cursory reference to "nominal voltage range" in the specification of the '654 and '847 patents, it is my opinion that a person of ordinary skill in the art would have understood the term "nominal voltage range" when used to modify the term "battery pack" to mean: *any voltage where the battery can reliably operate*. As a power tool is operated, the voltage of the battery pack will decrease over a range until the power tool is no longer operable. After this point is reached, the battery pack must be recharged in order for the power tool to be operated. The difference between the voltage of 100% state-of-charge (representing a fully charged battery pack) and 0% state of charge (representing a voltage where the power tool cannot be reliably operated) is the nominal voltage range of the battery pack.

2. **"state of charge"**

Relevant Claims	Hitachi Koki's Proposed Construction
'654 Patent:	**State of Charge**: The amount of charge remaining at a given time for a

Claim 62 '847 Patent: Claim 10	battery cell.

42. The asserted claims of the '654 and '847 patents use the term "state of charge" in the context of the state of charge of a battery cell. *See e.g.*, Ex. 5, '654 patent, col. 26, line 23 ("battery cell having a state of charge"); Ex. 6, '847 patent, col. 22, lines 35-36 ("battery cell having a state of charge").

43. It is my understanding that the '654 and '847 patents incorporate by reference the entire contents of U.S. patent application Ser. No. 10/720,027, which issued as U.S. Patent No. 7,157,882 (the "'882 patent") (attached as Exhibit 10). *See* Ex. 5, '654 patent, col. 1, lines 14-16; Ex. 6, '847 patent, col. 1, lines 15-17. I have been informed that when a patent incorporates the contents of another document (such as another patent), the incorporated information is as much a part of the application as filed as if the text was repeated in the application, and should be treated as part of the text of the application as filed.

44. The specification of the '882 patent (which the '654 and '847 patents incorporate by reference) clearly defines the phrase "state of charge" as "how much charge is left." For example, looking to the specification of the '882 patent (*i.e.*, the figures and text), the specification explains that the state of charge of the battery pack is the amount of charge left in the battery at a given time:

> In some constructions, the microprocessor 140 can determine the present state of charge of the battery 50 (***i.e., how much charge is left in the battery 50***) when the push-button 160 is depressed and outputs the charge level to the fuel gauge 155. For example, if the present state of charge of the battery 50 is approximately 100%, all of the LEDs 170 *a*, 170 *b*, 170 *c* and 170 *d* will be turned on by the microprocessor 140. If the present state of charge of the battery 50 is approximately 50%, only two of the LEDs, such as, for example, LEDs 170 *a* and 170 *b*, will be turned on. If the present state of charge of the battery 50 is approximately 25%, only one of the LEDs, such as, for example, LED 170 *a*, will be turned on.

Ex. 10, '882 patent, col. 8, lines 10-22 (emphasis added).

45. The specification also explains that the battery pack may include a "state of charge" indicator in the form a "fuel gauge." Ex. 10, '882 patent, col. 7, lines 53-56. The fuel gauge includes a light emitting diode ("LED") display that indicates the state of charge of the battery. *Id*. at lines 56-58. A microprocessor determines the present state of charge (*i.e.*, how much charge is left) when a push-button is depressed and outputs the charge level to the fuel gauge. *Id*. at col. 8, lines 10-14. For example, if the present state of charge (*i.e.*, amount of charge remaining) is 100%, all of the LEDs are turned on by a microprocessor. *Id*. at lines 14-17. If, for example, the state of charge is 50% (*i.e.*, amount of charge remaining), then two of the four LEDs will be turned on by the microprocessor. *Id*. at lines 17-19. Further still, if the state of charge is 25% (*i.e.*, amount of charge remaining), then one of the four LEDs will be turned on by the microprocessor. *Id*. at lines 19-22. In my opinion, this description indicates that the state of charge for the battery pack is the "amount of charge remaining at a given time for the battery pack."

46. The definition provided in the specification of the '882 patent is consistent with additional portions of the '654 and '847 patents and supports my opinion that "state of charge" for a battery cell means "the amount of charge remaining at a given time for a battery cell." For example, the specification of the '654 and '847 patents identify the state of charge for a battery cell as a percentage:

> In some constructions, the battery 20 can send eight averaged measurements such as, for example, an averaged pack state of charge measurement and an averaged individual cell ***state of charge for each of the seven battery cells*** 60 . For example, the battery 20 may send the following information: ***cell 1 14%, cell 2 14%, cell 3 15%, cell 4 14%, cell 5 16%, cell 6 14%, cell 7 14%***, and pack (e.g., cells 1 – 7) voltage 29.96 V.

Ex. 5, '654 patent, col. 16: line 63 – col. 17: line 3 (emphasis added).

It is my opinion that a person of ordinary skill in the art would have understood that based on this description, the state of charge for a battery cell is the amount of charge remaining in the battery cell at a given time.

47. Turning to the extrinsic evidence, a standard technical dictionary supports my construction of "state of charge." A technical dictionary entitled "The Illustrated Dictionary of Electronics" defines "state of charge" as "the amount of charge, measured in coulombs or ampere hours, in a storage cell or battery at a given time [a coulomb being an ampere second or 1/3600 of an ampere hour]. A measure of the available remaining energy in the cell or battery." Ex. 8, THE ILLUSTRATED DICTIONARY OF ELECTRONICS, 655 (8th ed. 2001). This definition provides support for my opinion that a person of ordinary skill in the art would have understood the term "state of charge" when used to modify the term "battery cell" to mean "the amount of charge remaining at a given time for a battery cell."

D. U.S. Patent Nos. 7,508,167

1. "individual state of charge"

Relevant Claims	Hitachi Koki's Proposed Construction
'167 Patent: Claims 1, 8, 12, and 15	**Individual State of Charge**: The amount of charge remaining, at a given time for an individual battery cell

48. The asserted claims of the '167 patent uses the term "individual state of charge" in the context of the state of charge of a battery cell. *See e.g.*, Ex. 7, '167 patent, col. 21, lines 8-10 ("each battery cell of the plurality of battery cells having an individual state of charge"), col. 21, lines 53-54 ("each battery cell having an individual state of charge"), col. 22, lines 27-29 ("each battery cell of the plurality of battery cells having an individual state of charge"), col. 22, lines 50-51 ("individual state of charge of each battery cell of the plurality of battery cells").

49. Similar to the '654 and '847 patents, it is my understanding that the '167 patent also incorporates by reference the entire contents of the '882 patent (attached as Exhibit 10). *See* Ex. 7, '167 patent, col. 1, lines 20-23. I have been informed that when a patent incorporates the contents of another document (such as another patent), the incorporated information is as much a part of the application as filed as if the text was repeated in the application, and should be treated as part of the text of the application as filed.

50. The specification of the '882 patent (which the '167 patent incorporates by reference) clearly defines the phrase "state of charge" as "how much charge is left." For example, looking to the specification of the '882 patent (*i.e.*, the figures and text), the specification explains that the state of charge of the battery pack is the amount of charge left in the battery at a given time:

> In some constructions, the microprocessor 140 can determine the present state of charge of the battery 50 (***i.e., how much charge is left in the battery 50***) when the push-button 160 is depressed and outputs the charge level to the fuel gauge 155. For example, if the present state of charge of the battery 50 is approximately 100%, all of the LEDs 170 *a*, 170 *b*, 170 *c* and 170 *d* will be turned on by the microprocessor 140. If the present state of charge of the battery 50 is approximately 50%, only two of the LEDs, such as, for example, LEDs 170 *a* and 170 *b*, will be turned on. If the present state of charge of the battery 50 is approximately 25%, only one of the LEDs, such as, for example, LED 170 *a*, will be turned on.

Ex. 10, '882 patent, col. 8, lines 10-22 (emphasis added).

51. The specification also explains that the battery pack may include a "state of charge" indicator in the form a "fuel gauge." Ex. 10, '882 patent, col. 7, lines 53-56. The fuel gauge includes a light emitting diode ("LED") display that indicates the state of charge of the battery. *Id*. at lines 56-58. A microprocessor determines the present state of charge (*i.e.*, how much charge is left) when a push-button is depressed and outputs the charge level to the fuel gauge. *Id*. at col. 8, lines 10-14. For example, if the present state of charge (*i.e.*, amount of charge remaining) is 100%, all of the LEDs are turned on by a microprocessor. *Id*. at lines 14-17. If, for example, the state of charge is 50% (*i.e.*, amount of charge remaining), then two of the four LEDs will be turned on by the

microprocessor. *Id*. at lines 17-19. Further still, if the state of charge is 25% (*i.e.*, amount of charge remaining), then one of the four LEDs will be turned on by the microprocessor. *Id*. at lines 19-22. In my opinion, this description indicates that the state of charge is the "amount of charge remaining at a given time".

52. The definition provided in the specification of the '882 patent is consistent with additional portions of the '167 patent and supports my opinion that "individual state of charge" means "the amount of charge remaining at a given time for an individual battery cell." For example, the specification of the '167 patent identifies the individual state of charge as the state of charge for an individual battery cell:

> In some constructions, the battery 20 can send eight averaged measurements such as, for example, an averaged pack state of charge measurement and an averaged individual cell ***state of charge for each of the seven battery cells*** 60. For example, the battery 20 may send the following information: ***cell 1 14%, cell 2 14%, cell 3 15%, cell 4 14%, cell 5 16%, cell 6 14%, cell 7 14%***, and pack (e.g., cells 1 – 7) voltage 29.96 V.

Ex. 7, '167 patent, col. 16, lines 49-56 (emphasis added).

It is my opinion that a person of ordinary skill in the art would have understood that based on this description, the individual state of charge for a battery cell is the amount of charge remaining in the battery cell at a given time.

53. Turning to the extrinsic evidence, a standard technical dictionary supports my construction of "state of charge." A technical dictionary entitled "The Illustrated Dictionary of Electronics" defines "state of charge" as "the amount of charge, measured in coulombs or ampere hours, in a storage cell or battery at a given time [a coulomb being an ampere second or 1/3600 of an ampere hour]. A measure of the available remaining energy in the cell or battery." Exhibit 8, THE ILLUSTRATED DICTIONARY OF ELECTRONICS, 655 (8th ed. 2001). This definition provides support for my opinion that a person of ordinary skill in the art would have understood the term "individual state of charge" to mean "the amount of charge remaining at a given time for an individual battery cell."

I declare under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed this 13th day of January, 2011, in Dalian China.

Dated: January 13, 2011

By. _____

Walter A. van Schalkwijk

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